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ART 34 A&DT

We claim:

1. A process for the preparation of expandable styrene polymers having a molecular weight M_w of greater than 170,000 g/mol, which comprises conveying a blowing agent-containing styrene polymer melt having a temperature of at least 120°C through a die plate with holes whose diameter at the die exit is at most 1.5 mm, and subsequently granulating the extrudate.
2. A process as claimed in Claim 1, wherein the expandable styrene polymer has a molecular weight in the range from 190,000 to 400,000 g/mol.
3. A process as claimed in claim 1 or 2, wherein the expandable styrene polymer has a molecular weight distribution having a polydispersity M_w/M_n of at most 3.5.
4. A process as claimed in any one of claims 1 to 3, wherein the styrene polymer employed is transparent polystyrene (GPPS), high-impact polystyrene (HIPS), an acrylonitrile-butadiene-styrene polymer (ABS), styrene-acrylonitrile (SAN) or a mixture thereof or with polyphenylene ether (PPE).
5. A process as claimed in any one of claims 1 to 4, wherein the blowing agent-containing styrene polymer melt comprises, in homogeneous distribution, from 2 to 10% by weight of one or more blowing agents selected from the group consisting of aliphatic hydrocarbons having from 2 to 7 carbon atoms, alcohols, ketones, ethers or halogenated hydrocarbons.
6. A process as claimed in any one of claims 1 to 5, wherein the blowing agent-containing styrene polymer melt comprises plasticizers, such as mineral oils, oligomeric styrene polymers and phthalates, in proportions in the range from 0.05 to 10% by weight, based on the styrene polymer.
7. A process as claimed in one or more of claims 1 to 6, wherein the blowing agent-containing styrene polymer melt is conveyed through the die plate at a temperature in the range from 140 to 300°C.
8. A process as claimed in any one of claims 1 to 7, wherein the die plate is heated at least to the temperature of the blowing agent-containing polystyrene melt.

9. A process as claimed in any one of claims 1 to 8, wherein the diameter (D) of the die holes at the die exit is in the range from 0.2 to 1.2 mm.
- 5 10. A process as claimed in any one of claims 1 to 9, wherein the die plate has holes having an L/D ratio (length (L) of the die zone, whose diameter corresponds at most to the diameter at the die exit, to the diameter (D) at the die exit) of at least 2.
- 10 11. A process as claimed in any one of claims 1 to 10, wherein the diameter (E) of the holes at the die entrance of the die plate is at least twice as great as the diameter (D) at the die exit.
- 15 12. A process as claimed in any one of claims 1 to 11, wherein the die plate has holes having a conical inlet with an inlet angle α of less than 180° .
- 20 13. A process as claimed in any one of claims 1 to 12, wherein the die plate has holes having a conical outlet with an outlet angle β of less than 90° .
- 25 14. A process as claimed in any one of claims 1 to 13, wherein the die plate has holes having different exit diameters (D).
- 30 15. A process as claimed in any one of claims 1 to 14, wherein the blowing agent-containing styrene polymer melt comprises 0.05 to 1.5% by weight of water, based on the styrene polymer.
- 35 16. A process for the preparation of expandable styrene polymers having a molecular weight M_w of greater than 170,000 g/mol, comprising the following steps:
- 40 a) polymerization of styrene monomer and, if desired, copolymerizable monomers,
- b) degassing of the resultant styrene polymer melt,
- 45 c) mixing of the blowing agent and, if desired, additives into the styrene polymer melt by means of static or dynamic mixers at a temperature of at least 150°C ,
- d) cooling of the blowing agent-containing styrene polymer melt to a temperature of at least 120°C ,

e) discharge through a die plate having holes whose diameter at the die exit is at most 1.5 mm, and

f) granulation of the blowing agent-containing melt.

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17. A process as claimed in claim 15, wherein step f) is carried out directly behind the die plate under water at a pressure in the range from 1 to 10 bar.

10 18. An expandable styrene polymer (EPS) obtainable by the process as claimed in claim 16, which comprises at most 500 ppm of styrene monomers.

15 19. An expandable styrene polymer (EPS) having a molecular weight M_w of more than 170,000 g/mol, which comprises from 0.05 to 1.5% by weight of internal water.

20 20. An expandable styrene polymer (EPS) as claimed in claim 19, wherein at least 90% of the internal water is present in the form of internal water droplets having a diameter in the range from 0.5 to 15 μm .

25 21. An expandable styrene polymer (EPS) as claimed in claim 19 or 20, whose expansion capability α is at most 125.

22. An expandable styrene polymer (EPS) as claimed in any of claims 18 to 21, which takes the form of granules having a diameter of from 0.4 to 1.8 mm.

30 23. An expandable granulated styrene polymer (EPS) as claimed in claim 22, which has a bulk density of at most 700 g/l.

35 24. An expandable styrene polymer (EPS) as claimed in any of claims 18 to 22, which comprises from 0.01 to 30% by weight of pigments.

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